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EU Calls for Comments on Nanotechnology

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Report Highlights:
The European Commission launched a public consultation on risk assessment methods for nanotechnologies. Nanotechnology refers to the controlled production of new materials with dimensions in the range of nanometers or dimensions thousands of times smaller than the diameter of a human hair. Industry is increasingly using nanotechnology and developing applications in a wide variety of sectors, including the food and agricultural sector. The online consultation, which will run until 16th December 2005, aims to gather feedback on the appropriateness of current risk assessment methods for nanotechnology products and on ways to improve them. These risk assessment methods will be an important aspect in the possible development of regulation specific to this new technology.

Includes PSD Changes: No
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What is nanotechnology?
Nanotechnology is the science and technology at the nano-scale of atoms and molecules, as well as the scientific principles and new properties that are related to that domain. One nanometer is one billion of a metre, tens of thousands times smaller than the width of a human hair and about the size of a small molecule. The term nanotechnology is used as a collective term, for the various branches of nanosciences and nanotechnologies.

There are two main methods to manufacture at nanoscale. The first method starts from micro-systems and miniaturises them ("top-down") and the second method is based on building structures at atomic and molecular level ("bottom-up"). The bottom-up approach is in an early development phase but its potential impact is far reaching. It is made possible by the Scanning Tunnelling Microscope to work on a molecular level and to pick up and move individual atoms.

Available products
Some products based on nanotechnology have already been marketed, such as medical products (e.g. bandages, heart valves), electronic components, scratch-free paint, wrinkle and stain resistant fabrics and cosmetics, such as sun creams.
Surfaces can be modified using nanostructures to become, for example scratch-proof, unwettable, clean or sterile. As the performance of materials under extreme conditions can be improved significantly, nanotechnology can advance developments in aeronautics and space industries. In general, nanotechnology has the potential to reduce waste across the whole life-cycle of products because less raw materials will be used for greater performance.

Nanotechnology in the Food sector
Nanotechnology may be a difficult concept for the public to grasp, because of its complexity and its invisible scale. In order to get an idea about the possibilities in agriculture and the food sector, a few examples are given to demonstrate existing applications or applications under development in the agricultural and food sector:
-Nanoparticles could increase the efficiency of fertilizers. However, they could also increase the ability of potentially toxic substances, such as fertilizers, to penetrate deep layers of the soil and travel over greater distances.
-Crops are being developed that could grow in a soil with high levels of salt or low levels of water. The genetic material of the crops is modified, which is at the scale of biological molecules.
-The biochip can be used to trace the spread of pathogens in food and feed. This could be useful to public health threats such as avian flu and mad cow disease.
-One of the first sectors to incorporate and commercialize nanotech products may be the integrated fish farming industry. A water cleaning product, based on 40 nm particles of lanthanum, absorbs phosphates from the water and prevents algae growth and is now tested on a large scale.

Food Packaging
Although the most important companies in the food sector are engaged in nanotech research related to food, the food industry is more conservative than other sectors. Indeed, consumers are more likely to see packaging composed of nano-scale materials before novel food products. In general, food packaging nanomaterials are being developed with enhanced mechanical and thermal properties to ensure better protection of food from exterior, thermal, chemical or microbiological effects.

The most prominent products to be developed are the new polymer nanocomposites for packaging and wrapping. These foils or membranes offer adjustable gas permeability which can help to better protect food. For example, clay nanoparticles are used to improve plastic

packaging for food products. The particles are dispersed throughout the plastic and are able to block oxygen, carbon dioxide and moisture from reaching fresh meats or other foods. The nanoclay also makes the plastic lighter, stronger and more heat-resistant.

Also in the pipeline are anti-microbial packaging materials. Materials exhibiting anti-microbial properties caused by nanoparticular silver or other substances have already entered the market. Another development is packaging with self cleaning surfaces. Dirt-repellent coatings at the nanoscale can prevent the invasion of microorganisms and ensure food safety.

Regulatory environment

Nanotechnologies present new challenges also for the assessment and the management of risks. It is important that appropriate data is available to perform risk assessments and to enable risk assessment procedures to be adjusted. The European Commission proposes the use of the existing food law wherever possible, but the particular nature of nanotechnology requires its re-examination and revision. Existing regulations rely frequently upon parameters that may turn out to be inappropriate for certain applications of nanotechnology, e.g. loose nanoparticles.

For example, threshold values are often defined in terms of concentration or mass, for example pesticides residues levels, below which a substance may be exempt from regulation. It is unclear how this would apply to nanotechnology. The relevance of such thresholds should be revisited and, when appropriate, changed. The Commission feels there is definitely a need for a case-by case approach to risk assessment.
Stakeholders have until December 16, 2005 to comment on the opinion of the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) which says that some modifications will be necessary due to the unique characteristics of N&N products.

Risk Assessment and Concerns Raised About Nanotechnology

Several non-governmental organisations raised concerns about the following aspects of nanotechnology**:**

- The toxicity of bulk material, such as solid silver, does not help predict the toxicity of nanoparticles of that same material.
- Nanoparticles have the potential to remain and accumulate in the environment and possibly in the food chain as well.
- The public has not been sufficiently involved in debates on the applications, uses, and regulation of nanotechnology. There might be unforeseen impacts on human health.
- 'Grey goo': Tiny robots generated with nanotechnology could acquire the ability to self-replicate.
- If the rich countries are the main drivers of the development of nanotechnology, applications which benefit developing nations will be side-lined.
- Research into nanotechnology is progressing and a regulatory framework is lagging behind.

Comment

Nanotechnology is a field of research and technical innovation on the scale of atoms and molecules and includes to some extent biotechnology as it concerns the level of biological molecules. The concerns about the potential threats to human health, society and the environment, will therefore be of the same nature in this case. Finally, the ultimate success of the marketing and trade in nanotech products will be determined by the regulatory environment, no matter how innovative or promising this technology may seem.
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